भारतीय मानक **IS 1448 (Part 51) : 2023**

Indian Standard

पेट्रोलियम और उसके उत्पाद — परीक्षण पद्धतियाँ

भाग 51 लुब्रिकेटिंग ग्रीस के लिए कॉपर स्ट्रिप संक्षारण परीक्षण

(पहला पुनरीक्षण)

Petroleum and its Products — Methods of Test

Part 51 Copper Strip Corrosion Test for Lubricating Greases

(First Revision)

ICS 75.100

© BIS 2023

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

August 2023 **Price Group 4**

Methods for Sampling and Test for Petroleum and Related Products of Natural or Synthetic Origin (Excluding Bitumen) Sectional Committee, PCD 01

FOREWORD

This Indian Standard (Part 51) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Methods for Sampling and Test for Petroleum and Related Products of Natural or Synthetic Origin (Excluding Bitumen) Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

The grease is tested for copper corrosion to ensure that it will protect the metal surfaces in case of prolonged contact.

This standard was first published in 1963 based on IP 112/56. The first revision has been brought out to keep pace with the latest technological developments and international practices. In this revision, following major changes have been made:

a) Limitations of the test method have been specified;
b) Reference clause has been incorporated; and
c) Designation and description of results have been incorporated in the reporting clause.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

Indian Standard

PETROLEUM AND ITS PRODUCTS — METHODS OF TEST

PART 51 COPPER STRIP CORROSION TEST FOR LUBRICATING GREASES

(First Revision)

1 SCOPE

1.1 This standard (Part 51) prescribes the method of test for the detection of substances corrosive to copper in lubricating greases subjected to static conditions.

1.2 This method does not correlate to the dynamic conditions the lubricating greases may encounter during the service period.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 336 : 2021	Ether — Specification (*third revision*)
IS 1745 : 2018	Petroleum hydrocarbon solvents — Specification (*third revision*)

3 OUTLINE OF THE METHOD

3.1 A cleaned and smoothly polished copper strip is immersed in the sample to be tested, which is then maintained at the specified temperature for the specified time. The strip is removed from the sample, washed with the specified petroleum hydrocarbon solvent and ethyl ether, and examined for evidence of etching, pitting or discoloration.

3.1.1 As lubricating greases are employed under a diversity of conditions, it is not possible to specify either the temperature or the duration of the test, but it is recommended that the temperature should be not higher than 20 ºC below the drop point of the sample.

3.1.2 In conformity with prevailing practice, copper has been prescribed as the test metal, but other metals may be used and in a form other than rolled strip, if desired.

4 APPARATUS

4.1 Glass Beaker — tall form, of 100 ml capacity

4.2 Copper Strip — cold-rolled strip not less than 1.5 mm thick, cut into pieces 75 mm long and 13 mm wide. Use one piece for each test.

4.2.1 The three grades of copper in common use, that is, tough-pitch high-conductivity copper, phosphorus deoxidized copper, and oxygen-free high-conductivity copper, have been found to give comparable results.

4.3 Oven — controlled within ± 2 ºC of the specified test temperature

5 REAGENTS

5.1 Ether — (*see* IS 336)

5.2 Petroleum Hydrocarbon Solvent (60/80) — boiling between 60 °C and 80 °C and aromatic-free (*see* IS 1745).

5.3 Carborundum Powder — No. 150 grade

6 PREPARATION OF THE COPPER STRIP

Polish the copper strip mechanically on the two faces to obtain a uniform finish, free from defects. Clean and polish the strip with a pad of cotton wool and Carborundum powder (No. 150) and then with successive pads of cotton wool until a fresh pad remains unsoiled after use. Wash the strip with ether and allow it to dry.

NOTE — Use clean forceps for all further handling of the strip.

7 PROCEDURE

Fill the beaker with the sample to within 6 mm of the top and, with the aid of a spatula, level and smoothen the surface. Coat a freshly prepared copper strip with a thin film of the material up to 48 mm from one end and insert that end vertically to a depth of 50 mm into the material contained in the beaker. Press the surface of the material into contact with the strip and level it again with the spatula.

Place the beaker and its contents in an oven controlled to within ± 2 ºC of the specified temperature for the specified period. At the end of this period, remove the beaker from the oven and allow it to cool to room temperature. Withdraw the copperstrip, wipe it with cotton wool, and wash it, first with the petroleum hydrocarbon solvent and then with ether. Examine the surface condition of the copper strip for etching, pitting or discoloration.

8 REPORT

8.1 Report if colour or scale is removed from the strip by the cleaning treatment and describe the state of the copper strip, using one of the following terms:

a) slight tarnish;
b) moderate tarnish;
c) dark tarnish; and
d) corrosion.

Otherwise report the test as negative.

8.1.2 Report the description in alpha-numeric format as per the description in Table 1 below. For example, 1(b) describes slight tarnish with dark orange colour.

8.1.3 *Interpretation of Results*

8.1.3.1 When a strip is in the obvious transition state between that indicated by any two adjacent standards, judge the sample by the more tarnished standard. Repeat the test if blemishes are observed due to fingerprints or to spots from any particles or water droplets that may have touched the test strip. Repeat the test also if the sharp edges along the flat faces of the strip appear to be in a classification higher than the greater portion of the strip.

8.1.3.2 Thin transparent corrosion films on the copper strip may produce a series of interference colours. As the corrosion film becomes thicker the series of colours may be repeated, and it follows that a particular colour cannot be related to the thickness of the film unless it can be established that it is one of the first-order sequences. For this reason, it is recommended that colours other than black or grey be not individually recorded.

9 PRECISION

The precision of this method has not been established.

Table 1 Designation and Description of Results

(*Clause* 8.1.2)

Sl No. (1)	Designation (2)	Designation Number (3)	Description (4)
i)	Slight Tarnish	1	a) Light orange, almost the same as a freshly polished strip b) Dark orange
ii)	Moderate tarnish	2	a) Claret red b) Lavender c) Multi-coloured with lavender blue and/or silver overlaid on claret red d) Silvery e) Brassy or gold
iii)	Dark tarnish	3	a) Magenta overcast on brassy strip b) Multi-coloured with red and green showing, but no grey
iv)	Corrosion	4	a) Transparent black, dark grey or brown with peacock green barely showing b) Graphite or lustre less black c) Glossy or jet black

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Methods for Sampling and Test for Petroleum and Related Products of Natural or Synthetic Origin (Excluding Bitumen) Sectional Committee, PCD 01

Organization	*Representative(s)*
Indian Institute of Petroleum, Dehradun	DR ANJAN RAY (***Chairperson***)
Air Headquarters, Ministry of Defence, New Delhi	SHRI S. A. TAWAB SHRI D. ANANDRAJ ROY (*Alternate*)
All India Instrument Manufacturers and Dealers Association, Mumbai	PROF G. M. RAO
Bharat Oman Refineries Limited, Bina	SHRIMATI ASAWARI KELKAR SHRI B. SRIDHAR (*Alternate*)
Bharat Petroleum Corporation Limited, Mumbai	SHRI R. SUBRAMANIAN SHRI C. SHANMUGANATHAN (*Alternate*)
Castrol India Limited, Mumbai	SHRI RAMAN RAI
Central Institute of Plastics Engineering and Technology, Bhubaneshwar	DR SMITA MOHANTY
Central Revenue Control Laboratory, New Delhi	SHRI V. SURESH
Chennai Petroleum Corporation Limited, Chennai	SHRI H. RAMAKRISHNAN DR V. SELVAVATHI (*Alternate*)
CSIR - Central Institute for Mining and Fuel Research, Dhanbad	SHRI P. K. SINGH SHRI S. R. K. RAO (*Alternate* I) SHRI S. DUTTA (*Alternate* II)
Directorate General of Aeronautical Quality Assurance, New Delhi	SHRI SANTOSH NAMDEO
Directorate General of Quality Assurance, Ministry of Defence, Kanpur	DR S. K. PANDEY SHRI SACHIN VINAYAK ZOPE (*Alternate*)
Elico Limited, Hyderabad	SHRI T. V. SHIVA K. RAO SHRI N. RAJU (*Alternate*)
GAIL (India) Limited, New Delhi	DR NITYANANDA PANDA DR S. MAHANTY (*Alternate*)
Gulf Oil Lubricants India Limited, Mumbai	SHRI SANJAY KUMAR SHRI MAYURESH GODBOLE (*Alternate* I) SHRI S. GANESH (*Alternate* II)
Hindustan Petroleum Corporation Limited, Mumbai	SHRI ELECHERAN KUMAR SHRI SANTOSH DHAKU BHOGALE (*Alternat*e I) SHRI MAHESH TOTLA (*Alternate* II)
HPCL Mittal Energy Limited, Noida	SHRI SATYABRATA BANDYOPADHYAY SHRI NARENDRA KUMAR GUPTA (*Alternate*)
Indian Oil Corporation Limited — Refineries and Pipelines Division, New Delhi	DR SHASHI PAL SINGH DR ASHUTOSH MISHRA (*Alternate*)

Organization	*Representative(s)*
Indian Oil Corporation (MKTG), Mumbai	Shri A. S. Krishnamoorthy Dr Sreekumar N. Veedu (*Alternate*)
Indian Oil Corporation (R and D Centre), Faridabad	Dr S. K. Majumdar
Indraprastha Gas Limited, New Delhi	Shri P. K. Pandey Shri Rahul Nigam (*Alternate*)
Lubrizol India Limited, Mumbai	Shri Anil Mane Shrimati Reena Kuril (*Alternate*)
Mangalore Refinery and Petrochemical Limited, Mangaluru	Shri Yogeesha Shri Anitha Shetty (*Alternate* I) Shri R. M. Praksah (*Alternate* II)
Ministry of Railways, Lucknow	Shri Rajesh Srivastava Shri Sonam Gupta (*Alternate*)
National Test House, Kolkata	Shri K. C. Naskar Shri P. K. Chakraborty (*Alternate*)
Nayara Energy Limited, Mumbai	Shri Mriganka Tarafdar Dhiraj Gondalia (*Alternate*)
Numaligarh Refinery Limited, Golaghat	Shri Sobhan Konwar Shri Anjan Kalita (*Alternate*)
Oil and Natural Gas Corporation Limited, New Delhi	Shri Gour Mohan Dass Shrimati Leena John (*Alternate* I) Shri Dinesh S. R. Reddy Kakuturi (*Alternate* II)
Oil India Limited, Duliajan	Shri B. C. Datta
Petroleum and Natural Gas Regulatory Board, New Delhi	Shri Anil Meghani Shri Noor Khan (*Alternate*)
Petroleum Conservation Research Association, New Delhi	Surendra Pratap Shri M. P. Bangwal (*Alternate*)
Reliance Industries Limited, Mumbai	Shri Pramod Mall
Shriram Institute for Industrial Research, Delhi	Dr Rajesh Kumar Dr Mukesh Garg (*Alternate*)
BIS Directorate General	Shrimati Meenal Passi, Scientist 'F'/Senior Director and Head (Petroleum, Coal and Related Product) [Representing Director General (*Ex-officio*)]

Member Secretary
Shri Hari Mohan Meena
Scientist 'C'/Deputy Director
(Petroleum, Coal and Related Products), BIS

This Page has been Intentionally left blank

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.:PCD 01 (18991).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:

		Telephones
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi